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CANINE LEPTOSPIROSIS IN KENYA

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The purpose of this article is to record the presence of canine leptospirosis, a disease hitherto undiagnosed in this Colony. Four cases are quoted in which leptospira organisms were observed either by dark-ground illumination or in sections from the organs of laboratory animals inoculated with infective material. The cases varied from hyperacute to chronic forms. Attention is drawn to a number of other unexplained deaths in kennelled dogs which, in retrospect, it is thought may also have been due to this disease.

Case No. 1

In August, 1948, an adult Airedale dog imported from India died suddenly whilst undergoing quarantine for rabies in the Kabete kennels. Early one morning the dog was found to be *in extremis*, although it had appeared to be in good health the previous evening. Death occurred a few hours later. A *post-mortem* examination was performed immediately.

The internal organs presented a flushed, slightly jaundiced appearance. The most striking lesion was an intense catarrhal inflammation along the whole length of the small and large intestines. The liver was very dark and both kidneys were congested and distended. The spleen pulp was soft and dark and the mucous membrane of the bladder was hyperaemic. The lungs and heart were normal macroscopically. The brain was congested.

Smears made from various organs when stained by Giemsa revealed no parasites. Tests for arsenic and lead were negative. Portions of affected organs were preserved for section by Levaditi's process.

A portion of one of the kidneys was excised aseptically, ground up in a mortar with the aid of sterile sand and normal saline, lightly centrifuged and the supernatant fluid inoculated into two guinea-pigs and four mice. One guinea-pig received 0·5 c.c. of material subcutaneously, the other 0·25 c.c. into the peritoneal cavity. Two of the mice were given 0·25 c.c. of material subcutaneously, the other two 0·125 c.c. into the peritoneal cavities.

The guinea-pig inoculated subcutaneously died within 48 hours from causes unknown. On the second day after inoculation one of the mice was seen to be sick and the following day the other three mice showed similar symptoms of ill-health. Their condition became progressively worse and they died on the fourth, fifth and sixth day respectively after infection. A haemolytic streptococcus was isolated from one of the spleens, but when grown for two days in serum broth and inoculated into four other mice no further deaths occurred. A suspension of pooled kidney, liver and spleen, and a portion of heart blood were sub-inoculated into a further series of mice without effect. From one of the dead mice, however, a kidney smear, stained by Fontana's method, revealed the presence of unidentified spirochaetes.

Seventeen days after inoculation the second guinea-pig, which had received 0·25 c.c. of material from the dog's kidney, was found dead. The onset of illness was sudden and no premonitory symptoms were observed. The *post-mortem* examination of the animal revealed a slightly icteric appearance of the tissues generally, together with enlarged, congested and haemorrhagic kidneys. The spleen and liver were also enlarged and congested and there were necrotic foci on the latter organ. Enteritis was present and there were petechiae on the fatty tissue of the peritoneum. Sections of liver, kidney and spleen prepared by Levaditi's process showed the presence of numerous spirochaetes.

Leptospirae in guinea-pig's liver. Levaditi.

A mixture of liver, kidney and spleen from this animal was sub-inoculated into two more guinea-pigs, one of which died a month later. The *post-mortem* findings were similar to the previous case and spirochaetes were observed in the kidney by dark-ground illumination.

Case No. 2

The subject on this occasion was an adult Alsatian dog from a private practitioner's boarding kennels in Nairobi. It had been ill for about a week with a febrile disease characterised by jaundice. Penicillin had been administered shortly before death, which occurred on 7.9.48. On opening the carcase a distinct uraemic smell became evident and the organs and tissues were stained yellow. A severe catarrhal enteritis was present, bile-stained mucus being superimposed over extensive haemorrhages. The liver was bronzed in appearance and many of the individual lobules were greyish-yellow in colour, suggesting considerable leucocytic infiltration. The kidneys were swollen, tense and congested. The spleen was enlarged, its pulp being dark but firm. There was an effusion of blood in the left epicardium. The lungs appeared to be normal.

An immediate examination of liver and kidney preparations by dark-ground illumination revealed the presence of spirochaetes.

Case No. 3

An adult Springer Spaniel bitch, imported from India, became ill whilst undergoing rabies quarantine in the Kabete kennels. The symptoms, characterised by an in-

sidious onset, gradually developed into those of chronic nephritis. Treatment for this disease proved ineffective. Profiting by the experience gained from the cases just described, a sample of the bitch's urine was obtained, centrifuged and the deposit examined by dark-ground illumination. Several spirochaetes were seen varying in length from 4 to 20 microns. Primary spirals were small but distinct. Activity was moderate and mainly rotatory and translatory. Hooked ends and " buttonholes " were not common.

Penicillin treatment was initiated, but by this time the dog's condition was serious and death supervened on 21.9.48, six days later.

Case No. 4

A cross-bred bitch, aged one year, which died suddenly without noticeable premonitory symptoms, was presented for *post-mortem* examination on 17.3.49. A striking yellowish-red, catarrhal inflammation was present along the whole length of the bowel mucosa. The liver was swollen, pale brown in colour and ruptured in several places. The left kidney also was ruptured and its pelvis distended with blood. The lungs were pale and studded with pin-point haemorrhages. The blood was dark and the spleen enlarged, with evidence of hyperplasia of the lymph nodes.

An immediate dark-ground examination was made and leptospira were seen in material from the spleen (very frequently) and kidney.

Discussion

Within recent years our knowledge of canine leptospirosis has been enriched considerably by the contributions of many workers in this field and it is not the intention in this article to review the literature on the subject. It often happens that a disease or condition at one time considered to be uncommon is shown to occur quite frequently when improved methods of diagnosis are evolved. This applies forcibly to leptospirosis which, it is now realised, has probably been present for many years in a significant proportion of the canine population of Great Britain and the United States. It is likely that a similar supposition can be applied to East Africa. In Kenya, the appearance of stock diseases new to the territory, such as trichomoniasis (Waddington), swine erysipelas (Piercy) and leptospirosis, and the sharp increase in the incidence of certain other diseases, such as tuberculosis and canine distemper, may be attributed largely to the very considerable increase of the animal population during the past ten years brought about by importations from other countries. For example, the recent exodus of Europeans from India has resulted in a stream of dogs passing through Kabete quarantine kennels.

Confusion with canine tick fever, caused by *Babesia canis*, may well have delayed the recognition of leptospirosis in this country since both diseases commonly are characterised by jaundice. Not infrequently cases of apparent tick fever are encountered which fail to respond to recognised specific treatments and it may well be that some of these are, in fact, due to leptospira.

The four cases of leptospirosis described in this paper are of added interest in that they represent three main clinical forms of the disease, namely, hyperacute, acute and chronic. Three of the four cases occurred in dogs in kennels.

As regards the organism itself, no conclusion is drawn as to whether *L. canicola* or *L. icterohaemorrhagiae* was present. Facilities were not available for the serum agglutination test to be carried out and the few attempts to culture the organism failed through bacterial contamination. Chick-embryo culture methods might have proved more successful. Some evidence that *L. icterohaemorrhagiae* is present amongst Nairobi dogs is furnished from the unfortunate experience of a Nairobi veterinarian (Pearson), who contracted a very severe form of jaundice following the examination of a case of canine leptospirosis.

For some years the writer was in charge of the Kabete quarantine kennels and, apart from an occasional case of tick fever or *Rickettsia*, the health of the dogs was generally excellent. From time to time, however, an unexplained death occurred following a very brief illness and similar deaths have occurred occasionally in Nairobi boarding kennels. On turning up the reports of the *post-mortem* examinations of these animals, a striking similarity of lesions was noticed. A severe, bile-stained, catarrhal enteritis was almost constant, the intestinal mucosa presenting a characteristic yellowish-red colour. The kidneys were tense and congested and the spleen pulp was usually soft and dark. In several cases the liver presented an orange-yellow, mottled appearance and dark, haemorrhagic glands commonly were seen. It seems not unreasonable to suppose that some or all of these cases may have been, in fact, caused by leptospira. In those cases where death occurred within a few hours of symptoms first being noticed, it seems likely that the organisms concerned, if leptospira, were *L. icterohaemorrhagiae*. It is interesting to note that the majority of these cases were in dogs imported from South Africa, Palestine, India and Somaliland and all the subjects were in kennels when they became ill. It may be added that in every case routine examinations for other canine diseases were made with negative results. The protocols of eight typical cases are given in the appendix.

Summary

1. The existence of canine leptospirosis in Kenya is confirmed and recorded.

2. Four cases are described in which leptospira were seen either directly with the aid of dark-ground illumination, or in sections of tissues from laboratory animals infected with material from the dogs concerned.

3. Three distinct clinical entities were encountered. These were: (i) a hyperacute form in which death was extremely rapid with no premonitory symptoms; (ii) an acute form in which illness lasted for about a week and was characterised by jaundice, and (iii) a chronic form with symptoms typical of chronic nephritis.

4. Eight other deaths amongst kennelled dogs which, it is now thought, may also have been cases of leptospirosis, are described.

Acknowledgments.—My grateful thanks are due to Mrs. M. Skinner, Assistant Kennel Overseer, and to Miss D. Reid, Laboratory Assistant, for their valuable assistance, and to the Director of Veterinary Services for permission to publish this article.

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Appendix

Protocols of *post-mortem* examinations of dogs which are now believed to have died of leptospirosis.

Case 1 (10.11.46)

Subject: Collie puppy from South Africa in Kabete quarantine kennels.

History: Found dead early morning. Apparently healthy previous day.

Post-mortem examination: Severe inflammation of the bowel. Spleen congested. Other organs normal macroscopically.

Case 2 (25.5.47)

Subject: One-year-old Alsatian dog from Palestine in Military Police kennels, Nairobi.

History: Ill for ten days with fever and jaundice.

Post-mortem examination: Flushed "toxic" appearance of peritoneum. Mucous membrane of mouth congested and "dirty." Gastro-enteritic mucosa bile-stained and inflamed. Mucosa of small intestine catarrhal and shedding away. Several bluish-red, elongated, haemorrhagic patches of inflammation in caecum and rectum. Liver heavily infiltrated. Bile port wine in colour. Cortical areas of kidneys flushed and congested. Right kidney studded with white spots in cortical area. Blood dark. Lungs and heart dark and congested but no petechiae. Prescapular and mesenteric glands dark and haemorrhagic.

Case 3 (27.9.47)

Subject: Local adult male fox terrier in boarding kennels near Nairobi.

History: "Off-colour" for some days with symptoms of jaundice. Died suddenly.

Post-mortem examination: Flushed "toxic" appearance in peritoneal cavity. Muscular tissue yellow. Mild catarrhal enteritis. Liver a mottled, golden brown colour and degenerated. Kidneys very congested, with extensive haemorrhages in cortical areas. Petechiae in larynx and mediastinal tissues. Epicardium studded with petechiae, ecchymoses on right endocardium. Blood dark and "thick." Spleen enlarged, with soft dark pulp. Prescapular lymph gland haemorrhagic.

Case 4 (29.11.47)

Subject: Adult female Dalmatian from India in Nairobi quarantine kennels.

History: Ill with ill-defined symptoms for some days. Died suddenly.

Post-mortem examination: Tongue pale and "furred," papillae not visible. Intense diffuse inflammatory patch occupying most of the gastric mucosa. Mucosa of the whole length of the bowel catarrhal and bile-stained. Liver engorged and infiltrated. Kidneys degenerated and infiltrated, with haemorrhages in boundary zones. Blood dark. Spleen enlarged. Brain congested.

Case 5 (2.6.48)

Subject: Adult wire-haired fox terrier from Italian Somaliland in Kabete quarantine kennels.

History: Found ill early one morning, died suddenly an hour later.

Post-mortem examination: Intense inflammation of the small intestine and caecum, the mucosa being a dull, diffuse, red colour and covered with yellow mucus. Liver infiltrated. Kidneys rather pale but otherwise normal. Lungs congested but no consolidation or petechiae. Sub-capsular haemorrhages in the brain.

Cases 6 and 7 (3.6.48)

Subjects: Two local Great Dane puppies from boarding kennels near Nairobi.

History: The whole litter and the bitch ill with febrile disease characterised by jaundice.

Post-mortem examination: Tissues jaundiced. Lower bowels grossly inflamed, the mucosae being covered with a catarrhal deposit and clotted blood. Livers a mottled orange-yellow colour. Petechiae present on both epicardium and endocardium. Spleens soft, pulp enlarged, with hyperplasia of the lymph nodes. Lymphatic glands dark and haemorrhagic. Brains congested.

Case 8 (18.6.48)

Subject: Adult Alsatian bitch from India in Kabete quarantine kennels.

History: Ill for one day with a febrile disease. Died suddenly.

Post-mortem examination: Liver infiltrated and jaundiced. Kidneys dark and congested. Mesenteric glands dark. Spleen very dark with almost liquid pulp.

NOTE. Following all the above *post-mortem* examinations, investigations were made for canine diseases by smears from various organs, and by bacteriological, biological and toxicological tests, all with negative results. Specific investigations for leptospirosis were not carried out.

A SLIDE FLOCCULATION TEST FOR THE DIAGNOSIS OF CONTAGIOUS BOVINE PLEURO-PNEUMONIA

BY

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Some years ago Campbell and Turner (1936; Campbell, 1938) described a complement fixation test for the diagnosis of contagious bovine pleuro-pneumonia. Initially they showed that of 2,062 cattle from an area known to be free of the disease 2,059 were completely negative and the other taree gave only weak reactions; that all of 25 acute cases gave a positive reaction, and that 42 of 45 chronic cases were positive.

It may now be recorded from the Sudan that all of 24 cases of contagious bovine pleuro-pneumonia diagnosed *post-mortem* by the writer were positive to the complement fixation test; that 236 of 291 cases diagnosed *post-mortem* by a Sudanese stockman were positive; that all of 51 artificially infected cases (*i.e.*, cattle developing swellings following inoculations of virulent cultures) were positive; and that one of 144 presumed healthy, non-vaccinated cattle gave a weak positive reaction (see Table I).

From these results it seems evident that the complement fixation test can be accepted as a reasonably accurate standard of reference for comparison with other methods of diagnosis.

In a country like the Sudan where there is a shortage of laboratory facilities, of trained staff and equipment and where, in any case, the cattle may be roaming over many hundreds of square miles, the complement fixation test has obvious disadvantages. Search was therefore made for some simpler method of diagnosis and eventually a flocculation test was devised. This paper records the results of comparisons between the two tests.

TECHNIQUE

(*a*) Complement fixation tests were carried out, with slight modifications, in a manner essentially similar to that described by Campbell and Turner.

Sera to be tested were diluted 1 : 10 in saline and inactivated in a water bath at 56° C. Normally in the test, dilutions of 1 : 10 and 1 : 20 only were used; a 1 : 10 serum control was included. Antigen, suitably diluted, was added to the first two tubes and saline to the control. Complement (2½ m.h.d.) was now added to all tubes which were then incubated in a water bath at 37° C. for half an hour before the addition of sensitised cells (3 per cent. washed sheep cells mixed with an equal volume of 5 m.h.d. of H.I.B.). Readings were taken after one hour in the water bath and doubtful ones confirmed after overnight storage in the ice-chest. The volume of all reagents was 0·4 c.c.

Concentrated antigen was supplied by Mr. A. D. Campbell. Titration against positive and negative sera showed that it needed to be diluted 1 : 40 in saline for the test.

Complement was either fresh guinea-pig serum or similar serum "preserved" and purchased from Messrs. Burroughs Wellcome & Co., London. H.I.B. was also purchased from Messrs. Burroughs Wellcome & Co.

Owing to the necessity of economising on complement, sera were generally stored over chloroform in the ice-chest

until a sufficient number had been collected to justify the setting up of a series of tests.

Various degrees of fixation were noted, but for simplification they are recorded here as positive (complete or nearly complete fixation at a dilution of 1 : 10 or lesser degrees of fixation at 1 : 20) or negative.

(*b*) Flocculation tests were carried out in two ways which, for convenience, are described as "wet" and "dry" methods. Generally the tests were carried out on fresh, unstored serum, but occasionally stored serum was used; storage over chloroform appeared to have no effect on the flocculation.

In the wet method two 4 mm. loopfuls of Campbell's concentrated antigen were mixed on a slide with one loopful of serum. The slide was rocked backwards and forwards 15 to 20 times and the mixture examined for flocculation through a watchmaker's lens. Various degrees and speeds of flocculation were noted.

In the dry method two loopfuls of serum were placed on a slide and allowed to dry in air. The dried serum was then re-dissolved in two loopfuls of concentrated antigen, rocked backwards and forwards and examined as above. Generally the dried sera were examined within an hour of drying, but, it may be noted, essentially the same results have been obtained with sera dried and stored at 37° C. for over a year—a finding which may be of some practical value since it means that specimens could be sent into a laboratory for diagnosis.

It is perhaps not surprising to record that the dry method usually resulted in stronger flocculation than the wet—presumably because there would be twice as much antibody present in two-thirds the volume. For the same reason the dry method showed rather more positive reactions than did the wet. A few sera reacted to the wet method only and *apropos* these it is probable that some failed to react to the dry method because the concentration of antibody was too great, *i.e.*, there was a zone phenomenon; on the other hand, some of these failed to react when dried even after dilution and it is evident that in these cases drying has an inhibitory effect.

The practice now is to test incoming sera by the wet method and to re-test any negative ones by the dry method; any serum reacting to test by either method is recorded as positive.

Results

(*a*) Comparison of the Flocculation and Complement Fixation Tests

Reference has been made to the groups of infected and healthy animals examined to confirm the validity of the complement fixation test. The sera from these animals was also subjected to the flocculation test with the results shown in Table I. It may be seen that sera from all the 24 cases diagnosed by the writer and from all the 51 artificially infected cases reacted to flocculation as did also 254 of the 291 cases diagnosed by a stockman and four of the 144 reputedly healthy animals.

In a country where the disease is endemic contact with the antigen (either in the individual or in its ancestors) cannot easily be ruled out entirely. In view of the fact that among the 144 healthy animals four reacted to flocculation and one to fixed complement it was decided to test sera from 200 English cattle (which have been free of the disease for over 50 years); as may be seen from Table I these were entirely negative to both tests.

These results show that the flocculation test is at least comparable with the complement fixation test and may even be more sensitive.

Table I

Showing the Numbers of Classified Sera Reacting to the Complement Fixation and Flocculation Tests

Classification	Numbers examined	Numbers positive to	
		Comp fix	Flocc.
Cases diagnosed *post-mortem* by writer	24	24	24
Cases diagnosed by stockman	291	236	254
Healthy Sudan cattle ...	144	1	4
Artificial infections	51	51	51
English cattle	200	0	0

Table II

Showing the Reactions of 1,294 Bovine Sera to Complement Fixation and Flocculation Tests

		Complement fixation		Total
		Positive	Negative	
Flocculation	Positive	417	129	546
	Negative	13	735	748
Total		430	864	1,294

A total of 1,309 sera have been tested; 15 of these were anti-complementary, leaving 1,294 for comparisons. The results are shown in Table II. It will be seen that of 430 sera positive to the complement fixation test only 13 (3·02 per cent.) were flocculation negative, whereas of 546 positive to flocculation no fewer than 129 (23·63 per cent) were negative to the complement fixation test. The difference (20·61 per cent. ± 2·27) is statistically significant and clearly suggests that the flocculation test is more sensitive. Further observations have since confirmed this belief.

(*b*) Test on Sera from Vaccinated Animals

In the 1,294 sera referred to in Table II were many from vaccinated animals and these have in fact weighted the numbers positive to flocculation only. In Table III are shown the reactions of a group of 290 vaccinated cattle; 65 of these were complement fixation positive and of these 65 only three (4·62 per cent.) were flocculation negative; on the other hand, of 140 flocculation positive sera 78 (55·71 per cent.) were complement fixation negative—a striking and significant difference (51·09 ± 7·34).

Table III

Showing Reactions of Vaccinated Animals

		Complement fixation		Total
		Positive	Negative	
Flocculation	Positive	62	78	140
	Negative	3	147	150
Total		65	225	290

In Table IV the reactions of the 459 Sudanese cattle referred to in Table I (excluding the artificial infections) are

shown. In brackets are the comparable figures had there been 65 complement fixation positive and 225 complement fixation negative sera (instead of 261 and 198 respectively); thus, for example, of 198 complement fixation negative animals 27 were flocculation positive, therefore had there been 225 complement fixation negatives there would have been $27 \times 225/198 = 30{\cdot}7$ flocculation positives. If now the observed figures of Table III are compared with the corresponding calculated figures shown in Table IV and tested for goodness of fit, it will be found that $\chi^2 = 85{\cdot}926$ which for 2 degrees of freedom gives a value of p far less than 0·01. In other words, the difference between the observed and calculated figures is not likely to have arisen by chance. It is clear also that the greatest portion of the χ^2 value (72·876 or 84·8 per cent.) lies in the flocculation positive-complement fixation negative cell.

TABLE IV

SHOWING THE REACTIONS OF THE CLASSIFIED SUDAN CATTLE

		Complement fixation		Total
		Positive	Negative	
Flocculation	Positive	255 (63·5)	27 (30·7)	282
	Negative	6 (1·5)	171 (194·3)	177
Total		261	198	459

It has become clear that, in general, vaccinated animals react to the flocculation test *before* they fix complement. A few typical examples of this are shown in Table V.

TABLE V

SHOWING REACTIONS OF ANIMALS BLED AT VARIOUS INTERVALS AFTER VACCINATION

Animal No.	Method of test	Days after vaccination			
		7	14	28	56
282	Complement fixation	—	—	—	
	Flocculation	—	+	+	
283	Complement fixation	—	+	+	
	Flocculation	+	+	+	
285	Complement fixation	—	+	+	
	Flocculation	+	+	+	
199	Complement fixation		—	+	—
	Flocculation		+	+	+
202	Complement fixation		—	+	+
	Flocculation		+	+	+
213	Complement fixation		—	+	
	Flocculation		+	+	

It has also been noted that artificially infected animals become flocculation positive before they fix complement and it therefore seems probable (though this has not been directly demonstrated) that the same thing happens with naturally infected animals.

These results, therefore, confirm the belief that the flocculation test is more sensitive than the complement fixation test.

(*c*) TEST WITH BRUCELLA ANTIGEN AND ANTIBODY

While having no relevancy to the title of this paper, it may be recorded here that 25 pleuro-pneumonia positive and 25 pleuro-pneumonia negative sera were tested by slide agglutination against a concentrated *Br. abortus* antigen; one sample from each group gave a very weak positive reaction. Similarly it may be noted that of the 200 English sera (all of which were pleuro-pneumonia negative) 48 agglutinated the Brucella antigen. From these results (though admittedly not necessarily from a more detailed investigation) it would appear that there is no antigenic relationship between the pleuro-pneumonia organism and *Br. abortus*.

SUMMARY

A simple slide flocculation test for the diagnosis of contagious bovine pleuro-pneumonia is described.

1,294 sera have been subjected to this and the complement fixation test and the results compared.

The results indicate that the flocculation test is not only a satisfactory method of serological diagnosis but also that it is more sensitive than the complement fixation test.

Acknowledgments.—I have to record my sincere thanks to Mr. A. D. Campbell for supplying me with antigen; to Dr. R. F. Montgomerie for arranging supplies of preserved complement, to Dr. A. W. Stableforth and Mr. J. R. Lawson for sending me sera from 200 English cattle; and to Mr. W. H. Glanville and Mr. J. T. R. Evans for encouragement and permission to publish.

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LIVESTOCK EXPORT GROUP

PEDIGREE CATTLE SHIPMENTS TO AUSTRALIA

In an announcement from the Livestock Export Group it is stated that at the time of the Group's annual general meeting, held in early May, there appeared to be little or no prospect of shipping even few of the large number of cattle then on the Group's register for Australia, but that by its direct action, it has obtained the consent of the Australian Veterinary Authorities in Canberra to ship cattle until the end of July—permission had previously been granted to extend shipments until the end of June. In both cases, the Australian Authorities ruled that animals could be so shipped, provided animals entered quarantine not later than May 31st, 1951.

Of 108 head of cattle, 22 were cancelled, 23 were test failures or held back for other reasons, and 63 (representing the Devon, Hereford, Jersey, Red Poll and Shorthorn breeds) satisfied all veterinary requirements and are now in quarantine. The following details may be of interest with regard to those which failed tests, etc.:—

Indefinite Agglutination Test	4
Avian Test failures	5
Avian *and* Mammalian Test failures	2
Withheld for veterinary or other reasons	12
	23

Of the 63 head in quarantine, 43 are in the London Station and 20 in the old station at Tilbury. Shipping has been obtained for 39 head of those at London and it is hoped to obtain shipping space for the remaining 24 before the end of July. When the final shipment of these cattle has taken place, a total of 203 head will have been despatched to Australia since the end of November, 1950.

The Group wishes to place on record its appreciation of the invaluable assistance rendered by the Animal Health Division of the Ministry of Agriculture and Fisheries in this instance, particularly in view of the short space of time in which animals had to be prepared for entry into quarantine.

CLINICAL COMMUNICATION

PARAFFIN POISONING IN CATTLE

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Paraffin poisoning is rare, and there are few references to it in the literature. Eaton (1943) recorded two fatal cases among cattle on one farm following the consumption of tractor paraffin. He expressed surprise that stock would consume the requisite quantity, but pointed out that water was not easily obtainable. Our experiments, recorded below, show that a large quantity (one gallon for a heifer of about 4½ cwt.) must be consumed before a fatal result will ensue. While an animal probably would have a considerable thirst before voluntarily consuming so large a quantity of paraffin, it is recognised that cattle show a remarkable diversity of appetite. The rare occurrence of this type of poisoning possibly is therefore due as much to the inaccessibility of paraffin as to an unwillingness to drink it. Eaton recorded violent symptoms and sudden death, but unfortunately no *post-mortem* examinations were made. Shenton (1937) reported the death of a cow five days after having been given by the owner a pint, not of tractor paraffin, but of paraffin lamp oil in an attempt to reduce tympany. Vomiting was the chief symptom and *post mortem* he found inflammation of the cardiac end of the oesophagus and of the abomasum, and a strong smell of paraffin in the contents of the stomachs. He made no reference to liver, kidneys, lungs or intestines. Harris (1937), on the other hand, claims frequently to have used doses of one pint of lamp oil in Ireland for treating cattle under 12 months old for stomach worms without any ill-effects, except a loss of appetite for not more than two days. It seems probable, therefore, that in the case of Shenton's cow, which was already ill, the lamp oil had very little to do with its death, specially as the dose was so much less than the fatal dose of the more irritant tractor paraffin.

Paraffin Poisoning on a Staffordshire Farm

A bunch of 25 dry cows were running in a park in October, 1947. At the same time work was going on in the field involving the use of tractor vaporising oil. There is evidence that a three-gallon bucket of paraffin was left in the field on the nights of Thursday, October 30th, and Friday, October 31st. The next morning on both occasions the bucket was still upright but empty. Added point is given to this in that, as with the case recorded by Eaton, water was not easily accessible in the park. On the second morning, November 1st, two of the cows, Cherrybeane, aged 3 years, and Ethel, aged 4 years, were observed by the owner to be unwell. They were worse on the succeeding two days and, as they were becoming weak, were removed by lorry and housed. Vomiting was reported in both animals. When seen by us on November 6th, both cows were off their food, were weak, but resisted handling, and appeared more in discomfort than pain. Cherrybeane was manifestly the worse affected and her dung was particularly hard, though Ethel was also constipated. The faeces carried a deal of tacky mucus material and a strong smell of paraffin. The rumen in both heifers was relatively empty, but the contents felt normal; the rhythmic sounds were present and not greatly reduced in frequency or volume. Laboratory examination of Cherrybeane's urine gave pronounced positive reactions for albumen and acetone. Blood samples were taken on November 7th and were analysed at the Ministry of Agriculture Veterinary Laboratory, Weybridge, for acetone. Cherrybeane showed 30 mg. per cent., and Ethel 50 mg. per cent.; on November 8th Cherrybeane died.

Several more visits were made and on November 17th, when it was decided that Ethel should be slaughtered, the following observations were made. The aroma, vaguely reminiscent of paraffin, was still very strong in the region of the cow. The breath smelt of acetone. The cow had become very tucked up, was still refusing almost all food, the left flank was hollow and ruminal sounds had ceased altogether. The dung still smelt of paraffin. Several times during the last week of life gelatine-like cuds were disgorged through the mouth, and these always smelt strongly of paraffin, particularly on breaking. This was in keeping with the presence of paraffin which was noted floating on the liquid contents of the rumen at autopsy a few hours later, though 16 days had elapsed since the cow was first observed to be ill.

A third cow, Ladybird, aged 5 years, was reported ill for the first time on November 9th, eight days after the others. She was off her food, somewhat listless and both breath and faeces smelt of paraffin, but not so strongly as in the other two.

Treatment

Glucose was administered intravenously as a stimulant, and after the discovery of acetonaemia was continued with Ethel and Ladybird. Magnesium sulphate and treacle were given by mouth. Ladybird made an uneventful recovery, but the purge appeared to have no effect on the constipation.

Post-mortem Examination

Cherrybeane, November 8th

The odour noted in the vicinity of the living animal was also present after death, and on opening the abdomen there was a distinct smell of paraffin in the stomachs and intestines. The blood clots in the heart were still quite warm and gave off a strong smell of acetone. The liver had undergone considerable fatty change and the kidneys were also degenerate. The cow was in an advanced stage of pregnancy. The foetal viscera smelt of paraffin.

On microscopic examination it was found that the lobular formation of the liver was obliterated. Glomerulonephritis was accompanied by fatty degeneration and the presence of casts in the uriniferous tubules. In the lungs there were multiple minute haemorrhages coupled with diffuse infiltration of polymorphs.

The findings in no way suggested injury due to fluid entering the lung through the trachea, but the irritant effect of continuously excreting paraffin in small quantities offers a ready explanation of the condition of the lungs and also of the kidneys.

Ethel, November 17th

The ruminal wall was unusually white, giving the appearance of having been cleaned, and the contents had a thin layer of paraffin floating on the top which gave a characteristic sheen. The lungs were emphysematous; fatty degeneration had occurred throughout the liver; the kidneys were mottled; the bladder wall was a little

thickened and inflamed, and throughout the carcase the muscle tissue was abnormally dark.

Microscopically no abnormality was observed in the rumen, but cloudy swelling and necrosis were apparent in the mucous membrane of the abomasum. Fatty degeneration and diffuse cellular necrosis were seen in the liver. Extensive necrosis had taken place in the Malpighian bodies and the uriniferous tubules of the kidneys, and the bladder wall was infiltrated with red blood corpuscles and polymorphs. Sections of muscle from the gluteal region revealed a slight infiltration of polymorphs but no other abnormality. There can be no doubt that the three cows in question consumed paraffin and in the case of Cherry-beane and Ethel the amount must have been considerable. It is impossible, however, to estimate how much was taken by each, as the total amount of paraffin consumed is not known accurately and other cows in the same park may have had sub-clinical doses. In view of the absence of any definite information on paraffin poisoning it was decided to carry out some experiments.

Experimental Production of Paraffin Poisoning*

Two Ayrshire heifers were obtained for this purpose; on each occasion the tractor oil was administered by stomach tube, followed by a small amount of water to clear the tube of paraffin and ensure an accurate dose. Close clinical observations were made, particularly of the digestive tract, during the experiment.

Heifer No. 1

Heifer No. 1 weighed 7 cwt. She received a small initial dose of two pints of tractor oil. The strong smell of paraffin in the vicinity of the animal and in the faeces again was noted, and this was true of all our experiments. There was some loss of appetite coupled with sluggishness of the rumen only on the second day after dosing.

On the eighth day, by which time all trace of smell had gone, a further dose, this time of four pints, was given. Inappetence was marked the next day and appetite did not return to normal until ten days after dosing. During this period ruminal movements were very erratic. Faeces were very loose on the first day but had become hard by the sixth. A curious feature was the yellowing of the coat, particularly in the region of the withers, which first appeared on the sixth day and remained until the 15th.

A third dose, one gallon of tractor oil, was given to the heifer after all symptoms of the second dose had ceased. This was 23 days from the beginning of the first experiment. Symptoms were more severe but lasted only about the same length of time as in the second dosing. Two new features, however, were noticed which had not occurred with the smaller doses. Shivering occurred on the day following administration of the paraffin, and on the same day sugar and bile were demonstrated in the urine. For the following five days (*i.e.*, up to the sixth day from dosing) sugar, bile and albumen were all present in the urine.

At no time with Heifer No. 1 was acetone found in the urine or blood. Temperature was taken regularly but remained within the normal range. No further experiments have been carried out on this animal and no long-term ill-effects have been observed.

Heifer No. 2

Heifer No. 2 weighed 4½ cwt. The first dose given to this heifer was at the same level weight for weight as the last dose to Heifer No. 1. This was five pints. In order to test whether lack of water had an effect on the severity of the symptoms, water was withheld for 15 hours before dosing and five hours after. The next day the heifer's appetite had gone and the rumen was inactive. This state of things persisted for 15 days. Shivering was noted on the seventh and eighth days, also the commencement of discharge from the eyes and nose. By the eleventh day the heart beat was slowing down and loss of condition was severe. Sugar, bile and albumen began to appear in urine tests, but from the 15th day recovery was rapid.

A second dose was given 35 days after the first, by which time the heifer had recovered fully and was approximately back to her original weight. This further dose was one gallon. The symptoms were the same as in the previous experiment but more severe and more prolonged. The heifer sank gradually and died 26 days after dosing. Temperature was normal until near the end, when it dropped to 99·5°.

In both tests the acetone level of the blood rose above normal. The consistency of the faeces was erratic, but quantity decreased in the second test in conformity with the prolonged loss of appetite.

Post-mortem Examination of Heifer No. 2

Post-mortem examination was carried out within a few hours of death. The carcase was emaciated, explained by the fact that the heifer had not fed properly since receiving the gallon dose of tractor vaporising oil 26 days before death. The discharge from the eyes, which had been noted frequently during the intervening period and which had dried on to the hair of the cheeks was still evident. The smell of paraffin remained marked in the vicinity of the carcase, especially after opening, despite the fact that it had cooled very considerably. On opening the carcase the rumen and reticulum were found to contain a considerable quantity of water covered by a sheen due to the paraffin; only about half the normal solid material was present, consisting entirely of hay. Slight localised inflammation was observed in the omasum and what little ingesta was present was very finely macerated. As noted in one of the earlier autopsies there was an unnatural cleanness of the wall not only in the rumen, but also in the reticulum and the omasum. The abomasum presented no abnormality to the naked eye. Apart from the caecum, the intestines were shrunken, due presumably to prolonged disuse, and the small intestine was diffusely inflamed. The contents were of a milk-like appearance in the small intestine, while in the large there was a free-flowing brown fluid. The lungs were emphysematous. The liver was friable but lacked the yellow appearance of earlier *post-mortem* examinations. The cortices of the kidneys were extremely pale, the mucosa of the bladder was mildly hyperaemic and the urine in the bladder cloudy. In addition to albumen, traces of sugar and acetone were found in the urine.

Microscopic examination revealed many findings similar to the cases already reported. Cloudy swelling was present right through the wall of the abomasum, but was most pronounced in the glandular region, with slight hyperaemia in the mucosa. There was a heavy infiltration of lymphocytes and polymorphs into the mucous membrane of the small intestine. The liver showed diffuse fatty change and cellular necrosis, and an infiltration of epithelioid cells occurred at two points in the sections examined. Diffuse fatty degeneration and cellular necrosis were also observed in the kidneys. The glomeruli were swollen and distorted.

* Carried out under Home Office licence.

Casts were present in the tubules and interstitial oedema was widespread. Casts and a few red blood cells were found in the urine.

Blood Analyses

In addition to determining acetone as we requested, Dr. W. M. Allcroft decided to include calcium and magnesium determinations as the laboratory was interested in the effect, if any, of different experimental procedures on these constituents of the blood. The acetone content was normal throughout for Heifer No. 1, but rose following dosing of Heifer No. 2, and remained high for about ten days on the smaller dose and 14 days on the larger. Calcium did not vary greatly, but magnesium dropped slightly following the biggest dose with Heifer No. 1, and more definitely following the second dose with No. 2. Reference to the clinical notes made during the experiments shows that low Mg coincided with occasions when shivering was observed.

Discussion

The fatal dose of tractor paraffin will, like any other poison, vary somewhat for different individual animals, but it is significant that a dose of one pint per 100 lb. bodyweight (final dose to Heifer No. 1 and first dose to Heifer No. 2) failed to kill in both cases, and the large dose of 1·6 pints per 100 lb. only proved fatal nearly four weeks after dosing.

The weights of the cows Cherrybeane and Ethel were estimated at 7½ cwt. and 8 cwt. respectively. A dose of 1·6 pints would therefore require a joint consumption of 27 pints. This would be little more than one full bucket, and, judging by the comparative severity of the symptoms, it is probable that they drank more in the two nights combined. The cow Ladybird, estimated at 10 cwt., must have had a relatively small dose in view of her speedy recovery, but the delay in the appearance of symptoms is surprising. In the later experimental work symptoms appeared within two days even with the smallest dose.

Chemical analysis has shown that the acetonaemia observed in the clinical cases is not specific in experimentally induced paraffin poisoning. It was noted that, despite fairly large single doses of tractor oil, Heifer No. 1 never showed acetonaemia. In the case of No. 2 deprivation of water may have helped to induce acetonaemia following the first dose, and the second dose was much bigger, volume for weight, than any dose administered to No. 1.

The most interesting feature in connection with serum magnesium estimations was the appearance of shivering and nervousness at the periods of lowered magnesium content. Eaton's observations of violent symptoms in the terminal phases of accidental paraffin poisoning suggest that his cases might also have shown lowered serum magnesium, though this point was not investigated. It seems as if a dose of tractor paraffin of one pint per 100 lb. live weight, or more, induced temporary hypomagnesaemia, not necessarily accompanied by acetonaemia.

The most consistent symptoms have been inappetence and the smell of paraffin in the vicinity of the animal. Constipation, which was so apparent in the cases of accidental poisoning, was erratic in the experiments. Nor is this explained by the change of season, for the experimental animals were kept inside. *Post mortem*, liver and kidney degeneration accompanied by the smell of paraffin, particularly in the rumen, were observed consistently.

Summary

Paraffin (tractor vaporising oil) poisoning was observed in three grazing cows and an experiment to discover the effects of varying doses was carried out. Paraffin persisted in the digestive tract for a period of weeks, and the smell of paraffin was in evidence in the vicinity of the animals. Inappetence was a consistent symptom, and constipation was pronounced in the accidental cases. The occurrence of acetonaemia and hypomagnesaemia are discussed. *Post-mortem* degeneration of the liver and kidneys is recorded.

Acknowledgments.—We are indebted to Dr. W. M. Allcroft, of the Ministry of Agriculture Veterinary Laboratories, Weybridge, for much helpful advice and the analyses; also to Mr. F. T. Brown, Technician at the Veterinary Investigation Centre, Wolverhampton, for the preparation of the histological specimens.

References

Eaton, G. (1943) *Vet. Rec.* **55.** 19.
Harris, A. C. (1937.) *Ibid.* **49.** 497.
Shenton, A. (1937.) *Ibid.* **49.** 454.

AUREOMYCIN AND CHLORAMPHENICOL CONTROLLED

A provision was made in the Penicillin Act of 1947, whereby other substances can be brought within its scope. The Aureomycin and Chloramphenicol Regulations (S.I. 1951 No. 919) have been issued making the supply of these two antibiotics subject to the same control as has hitherto applied to penicillin and streptomycin. The effect of these regulations is that these products and preparations containing them may be supplied to the public only by or in accordance with the directions of doctors, dentists, or veterinary surgeons, or by pharmacists on the prescription of doctors, dentists, or veterinary surgeons and may be administered only by, or in accordance with, the directions of such qualified practitioners. Such a prescription may be dispensed only once, and not more than three months after the prescription was given; if, however, the prescription directs that it may be dispensed on a specified number of occasions or at specified intervals in a specified period, it may be dispensed in accordance with that direction.

Commenting on the introduction of these regulations, *The Pharmaceutical Journal* observes: "At one time, both aureomycin and chloramphenicol were thought to have the marked advantage of not producing resistance, but, unfortunately, these high hopes have not been fulfilled: acquired resistance to these antibiotics is so far rare, but is not unknown. It can, of course, be argued that as they have always been given orally, the risk of inadequate oral dosage is reduced. Nevertheless, it is not eliminated and the prevention of self-medication is an elementary precaution which the health authorities could not ignore."

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ANTIBIOTICS REVIEWED

Ten years ago the use of the term "antibiotic" was restricted to the research laboratories of microbiologists and botanists. Its more common use to-day—most people seem to know that it has something to do with penicillin—is a measure not only of the rapid advances of the last decade but also of the increasing general interest in scientific topics. In the May issue of the *Journal of Pharmacy and Pharmacology*, Dr. E. P. Abraham, of the Sir William Dunn School of Pathology at Oxford, reviews the present status of antibiotic substances and deals particularly with chloramphenicol, aureomycin, terramycin and neomycin. The last two substances have been introduced only recently; in fact, neomycin is still undergoing clinical trial. None of the compounds isolated since the discovery of penicillin has proved to be of such general value, and none of those isolated from fungi has been found suitable for clinical work. A few polypeptide compounds obtained from bacteria have some limited use, and it is from the group of micro-organisms known as the *Actinomycetes* that the successful new antibiotics have been obtained. Many more of the serious bacterial diseases may now be effectively treated, and, with the introduction of chloramphenicol, aureomycin and terramycin, an attack has been launched on the rickettsial and some viral infections. Neomycin is being tried in the treatment of tuberculosis, but it is not yet known whether it will prove superior to streptomycin, or what effect it will have on streptomycin-resistant cases. The crude drug has been reported to cause kidney damage, although there is hope that the pure compound will prove to be free from this disadvantage.—*Pharm. J.*

ABSTRACTS

[Diseases of Calves. SUTHERLAND, A. K. (1950.) *Austral. Vet. J.* **26.** 238.]

An account is given of some of the diseases of calves met with in Queensland. These have an age incidence (three to eight weeks) somewhat higher than in Great Britain or U.S.A. (birth to four weeks) whilst pneumonia would appear to be of greater significance than scours. A brief reference is made to the present state of knowledge concerning these two conditions and the need for research into both as they occur locally is stressed, although it is conceded that losses from the latter should be reduced by improved husbandry. Salmonellosis receives brief reference, *S. typhimurium* being the most important agent although *S. dublin* and *S. orientalis* also have been implicated in calf mortalities. Calf diphtheria is recognised but appears to be of only minor significance.

Special attention is paid to losses from lead poisoning, which is regarded as likely to be a far more common cause of death than is supposed. In this connection the importance of the examination of liver and kidney tissue as a diagnostic aid is emphasised.

Attention is also given to the occurrence of leptospirosis in calves in Queensland, the symptoms of fever, anaemia, haemoglobinuria and icterus being a constant feature. The need for an early diagnosis is urged if treatment with penicillin or sulphamezathine is to be attempted, and the value of the examination of urine (the addition of 0·5 per cent. formalin being a valuable preservative) under a dark ground illumination is stressed. Details of laboratory diagnosis are given and the possible association of swine with the outbreaks of this disease in calves is reiterated.

The author points out the need for extension of local investigation and research into the problem of calf losses of obvious economic importance in order to obtain more accurate and detailed data under Australian conditions.

W. T. R.

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[Leptospirosis in Cattle. BAKER, J. A., & LITTLE, R. B. (1948.) *J. Exp. Med.* No. 48. 295–308.]

An account is given of a detailed study of the pathogenicity of an infective agent found present in samples of much altered milk. This was at one time tentatively regarded as a virus but is here shown to be a spirochaete. It proved to be pathogenic for laboratory animals (mice, guinea-pigs, rabbits, puppies and pigs) as well as for cattle (adult and calves). The organism grew well on embryonated egg and this material together with infective blood was used in transmission experiments. This was accomplished successfully subcutaneously in 15 animals or by the intranasal route (three out of five) and by contact (three out of five). Following a period of incubation of seven to nine days in adults and two to seven days in calves, illness in the former was manifested by fever and changes in the milk, which became thickened and yellow in colour. In calves fever was accompanied by some anorexia lasting one to three days, a few dying in one to two days. Death was heralded by the onset of haemoglobinuria.

Pathological lesions were confined to the kidneys, which appeared congested and studded with white spots. Histologically interstitial nephritis was the essential finding.

The spirochaete was recoverable from blood and milk during the febrile stage and later from urine for a period up to two months. Recovery resulted in a strong immunity and antibodies could be demonstrated in the blood.

(*Concluded at foot of next column*)

Although it assumed a septicaemic form, the authors regard the condition described as differing from other reported cases of spirochaetosis in cattle and believe that natural infection is probably via the intranasal route following droplet infection (splashes of infected urine) although they suggest that inoculation by insect vectors should also be considered since spirochaetes can be found in the blood.

W. T. R.

NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY

MEETING OF COUNCIL

A meeting of the Council of the Society was held in Manchester on May 9th, 1951, Mr. John Holroyd presiding. Among matters dealt with were the following:—

DEFENCE FUND CLAIMS.—Twelve cases brought forward from the previous meeting and 15 new cases were considered. In five cases the Society's solicitors had obtained the withdrawal of claims without recourse to the Courts. Nine other cases had been satisfactorily cleared by the Hon. Secretary after discussions with the Executive. Other cases dealt with included:—

Case No. 33/50.—Liability admitted and claim settled at £100.

Case No. 17/50.—Liability admitted, but as members had settled at £100 before consulting the Society, an *ex-gratia* payment of £30 only was made, being the admitted value of the dog.

Case No. 18/50.—Horse expired under chloroform. No apparent negligence and members advised on procedure.

Case No. 35/50.—In-calf heifer. Passing probang, assistant pushed tube through oesophagus. Agreed a normal risk of operation, but member advised to settle at £15 without admitting liability. Settled and member reimbursed.

Case No. 1/51.—Loss of pigs by swine fever said to be caused by crystal violet vaccine. Society's solicitors instructed to act as necessary.

Case No. 9/51.—Pedigree Jersey with cystic ovaries treated with a proprietary preparation. Warning note *re* shock if given intravenously not observed in package. Member to be asked to supply further details.

Case No. 10/51.—Hunter treated for colic given saline injection by stomach tube. Insertion of tube said to have caused horse to bleed to death. Valued at £300. No apparent negligence in treatment and no *post-mortem* examination to establish cause of death. Case referred to solicitors for defence if necessary.

Case No. 11/51.—Two dogs accepted for quarantine said to be infected with lice on release and unsuitable for showing. No apparent negligence and case referred to solicitors for defence, as necessary.

Case No. 12/51.—Three injections of stilboestrol said to have caused abortion of dead heifer calf. Agreed mummification possible and member to be asked for further details.

Other matters dealt with included the following:—

INCOME TAX.—The local Inspector of Taxes had assured the Hon. Secretary that subscriptions to the Society's Defence Fund would be regarded as an allowable expense in the accounts of veterinary surgeons.

THIRD PARTY INSURANCE.—It was agreed that the memorandum prepared by the President should be circulated to all members with the Annual Report.

Eire Students.—Lloyd's Underwriters had advised that a separate scheme would be required to cover students in Eire against Employers Common Law Liability. The cost would be at least £5 per student. In view of cost and surrounding difficulties, it was agreed not to proceed with scheme and to rely on Eire members obtaining individual cover.

Veterinary Practitioners.—It was agreed that the existing Rules limiting membership of the Society to members of the Royal College should not be amended.

Benevolent Grants.—It was agreed that the existing grants be continued. Four special cases coming within the scope of the Benevolent Fund were considered and appropriate decisions were made. In one case (an application for assistance for the sole purpose of keeping a daughter at a medical college) it was agreed that assistance would constitute benevolence as distinct from charity and that the case was not one which the Society could accept.

Finance.—Income and expenditure from January 1st to April 30th, 1951, were discussed. It was decided to invest a further £2,500 of the liquid balance of £3,352 15s. 2d. in the Defence Fund. The liquid balance on the Benevolent Fund was £33 4s. 1d. only.

QUESTIONS IN PARLIAMENT

Horses (Transit Regulations)

Sir T. Moore (June 14th) asked the Minister of Agriculture if he can yet report the result of his negotiations with the Governments of Northern Ireland and Eire to secure their acceptance of suitable regulations governing the export and transit of horses by sea from Ireland.

Mr. T. Williams: Proposals for regulating the transit of horses to this country were sent to the Governments of Northern Ireland and of the Irish Republic, and to the other interests concerned, some weeks ago for their observations. The Government of Northern Ireland has stated that it will consider making an Order on the lines proposed. The Government of the Irish Republic have suggested certain amendments to the proposals and these are being discussed between officials. Certain of the other interests consulted have not yet given their final observations.

My Department will complete the consultations as quickly as possible, but it is necessary to allow a reasonable time for the consideration of the proposals, which are of a comprehensive and detailed character. I am not proposing to amend the existing regulations which govern the transit of cattle by sea from Ireland. These regulations have been in force since 1927 and appear to be satisfactory.

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Fowl Pest, Dorset

Mr. Crouch (June 14th) asked the Minister of Agriculture how many cases of fowl pest there have been in the county of Dorset in the latest convenient period; what was the number of birds destroyed; and when was the last outbreak.

Mr. T. Williams: Since the beginning of 1950 there has been only one outbreak of fowl pest in Dorset. This outbreak occurred on January 16th, 1951, and 818 birds were slaughtered.

ARTIFICIAL INSEMINATION OF POULTRY

Dr. R. F. Gordon, of the Animal Health Trust, who is in charge of large-scale poultry trials a Goosnargh, near Preston, reports that the first big experiment in Britain of artificial insemination of poultry has been successful. Twelve hundred hens have been artificially inseminated by the use of only eight male birds. In normal breeding 100 cockerels would have been needed. Out of 16,147 eggs produced by insemination, 6,478 proved fertile and from the 5,337 chicks that were hatched 2,545 pullets were obtained.

We hope to publish an extended account of these experiments in a later issue.

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Weekly Wisdom

Britain faces the future with a strong Constitution.—Lord Hankey.

NOTES AND NEWS

Diary of Events

June 23rd.—Scottish Metropolitan Division, N.V.M.A., Ladies' Guild. Garden Fête and Sale in aid of the V.V.B.F., at Bush House, Milton Bridge, Midlothian, 2.30 p.m.

Sept. 23rd-29th.—Sixty-ninth Annual General Meeting and Congress of the National Veterinary Medical Association, at Eastbourne.

N.V.M.A. Meetings in Edinburgh

Wednesday, July 11th:
11 a.m. Home Appointments Committee.
2 p.m Organising Committee.
4 p.m. Parliamentary and Public Relations Committee.

Thursday, July 12th:
11 a.m. Veterinary State Medicine Committee.
2 p.m. General Purposes and Finance Committee.

Friday, July 13th:
11 a.m. Council.

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THE DUTCH VETERINARY CONGRESS

Visit by the President and Mrs. Hodgman

At the April meeting of the Council of the Association, the President, Mr. S. F. J. Hodgman, was appointed to represent the N.V.M.A. at the Dutch National Veterinary Congress organised by and held at the University of Utrecht from June 7th to 9th, 1951.

The President, who was accompanied by Mrs. Hodgman, was most enthusiastically received by the Dean and Members of the Veterinary Faculty and both were accorded a "right royal" welcome, which was manifested not only in the generous hospitality displayed but in the ovation which greeted the President's message of fraternal wishes and goodwill.

Mr. Hodgman was asked to convey the heartiest reciprocal greetings of the Dutch Veterinary Association.

During his most enjoyable and instructive visit our President not only was afforded the opportunity of seeing the whole of the veterinary faculty of the University of Utrecht, but met many colleagues, including Professor Romijn, Dean of the Faculty, Professor Hirschfeld and Professor Keidel, and discussed with them subjects of common interest. Professor Dr. G. M. van der Plank, Secretary, had arranged everything to make the President's stay in Holland a happy one, and during the proceedings remarked upon the many benefits which would accrue by such exchanges of visits between representatives of the two countries. In his reply Mr. Hodgman most heartily endorsed this sentiment, expressing the wish that there would be many opportunities in the future to meet again either in Holland or Britain.

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PERSONAL

Captain Vincent Boyle Invested with the C.M.G.

Members of the profession will be interested to learn that, at a simple but impressive ceremony at the British Embassy, Buenos Aires, on May 31st, Captain Vincent Boyle, M.R.C.V.S., was invested with the insignia of Companion of the Order of St. Michael and St. George, by H.E. the British Ambassador, Sir Henry Bradshaw Mack, on behalf of His Majesty the King, conferment having been made on the occasion of the New Year's Honours, 1949.

The investiture took place at noon in the presence of Lady Bradshaw Mack, Mr. J. Henniker-Major, First Secretary, Mr. M. Brown, Second Secretary, Captain C. B. Alers-Hankey, Naval Attaché, Mr. A. G. Mill, Agricultural Attaché, and Mrs. Mill, Mr. A. W. Landymore, First Secretary (Information), Mr. A. J. Cooke and Mrs. Cooke, Mr. M. M. Angus and Mrs. Angus, Mr. R. Fould, of the Ministry of Food, Mr. B. A. Claxton, of the Ministry of Agriculture, and Mrs. Claxton.

Mr. Boyle joined the Ministry of Agriculture and Fisheries in 1913 as Veterinary Inspector. His service with the Ministry was interrupted by the First World War, during which he served as an officer of the Royal Army Veterinary Corps from 1915 to 1919. He saw service overseas in the Middle East from 1916 to 1919.

Mr. Boyle resumed his duties with the Ministry in various parts of the British Isles in 1919, and went to Buenos Aires in 1936 as representative of the Ministry of Agriculture in South America. He returned to the U.K. for home service in 1937, but was again appointed to South America in 1943, where he has remained since as Head of the U.K. Veterinary Mission. His appointment covers, besides Argentina, the Republics of Brazil, Chile and Uruguay. A

comment on his appointment from a local official source states: "Chief among his duties is to ensure the freedom from disease of meat shipped from South America to the United Kingdom, a matter of vital importance to both seller and purchaser. Mr. Boyle has acquitted himself of this task with a tact and geniality to which the number of his official, business and personal friends bears witness."

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Sir Thomas Dalling Honoured

It is announced that amongst those upon whom Queen's University, Belfast, will confer honorary degrees next month is Sir Thomas Dalling, M.A., M.R.C.V.S., F.R.S.E., Chief Veterinary Officer of the Ministry of Agriculture and immediate Past-President of the Royal College of Veterinary Surgeons. Sir Thomas will receive the Doctorate of Science of the University.

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Birth.—Warren.—On June 9th, 1951, at Aylsham, Norfolk, to Natalie (*née* Chambers) and William Warren, M.R.C.V.S., a daughter.

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Dr. and Mrs. Montgomerie to Visit South and East Africa.—The many members of the profession who know that Dr. Montgomerie has been indisposed during recent months will be pleased to learn that he is now almost quite fit again.

The Wellcome Foundation, however, have decided that before he returns to active work in this country he should have a tour abroad. Dr. and Mrs. Montgomerie—who also has been indisposed—left Britain on June 14th as passengers on the *Stirling Castle*, due to arrive in Cape Town on June 28th. After a stay of about two weeks in that city, they will visit Johannesburg and Pretoria, thereafter spending a short time in Southern and Northern Rhodesia before reaching Kenya on August 7th. After a three-week stay in that colony they will return to Cape Town to sail for Britain; to arrive home on September 14th—in good time for the Eastbourne Congress.

We know that their many friends in the profession will wish Dr. and Mrs. Montgomerie a very pleasant trip, and will look forward to both of them returning home fully restored in health.

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Dutch Student Desirous of Seeing Practice.—Mr. Rienk J. Feddema, Ferwerd, Friesland, Netherlands, would be glad to hear from a large-animal practitioner in England with a view to seeing practice and helping generally. Aged 19, he is the son of a Dutch veterinary surgeon and wishes to spend about four weeks here prior to entering college.

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Sir Alfred Munnings has become President of the newly formed Society of Animal Art.

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R.C.V.S. OBITUARY

Smith, Thomas Anderson, c/o Auldton, Dunlop, Ayrshire. Graduated Edinburgh, December 16th, 1933. Died at Guildford May 22nd, 1951.

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R.C.V.S. DIPLOMA IN VETERINARY STATE MEDICINE

On the results of the examination held by the Royal College of Veterinary Surgeons in Edinburgh from June 7th to 12th, 1951, the following candidates have been awarded the Diploma of Veterinary State Medicine: Wm. Barr Martin, John Bassett Nadin, John Malcolm Olivant, Bert Simpson, Stuart Young.

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FRENCH VETERINARY CONGRESS AT ALFORT

Commemorative Stamp Issued by Veterinarian Minister of Postal Services

A unique occurrence in the issue of a commemorative stamp marked this year's French Veterinary Congress at Alfort, which was held on June 7th to 10th.

The present French Minister of Postal Services, Telegraphs and Telephones (Ministre des P.T.T.) is a veterinarian, M. le Docteur-Vétérinaire Brune, who enthusiastically supported the Congress and presided at a banquet on June 8th at the Town Hall, Paris, to commemorate the 50th anniversary of the founding of the Society of Comparative Anatomy. To mark the occasion and in honour of veterinary science, M. Brune had a special postal stamp issued showing the world's first veterinary college at Lyons, which was founded in 1762, together with portraits of Nocard, Bouley and Chauveau. Postcards depicting the Lyons school were also available and the postal authorities franked these with the overprint "IXemes Journees Veterinaires Alfort."

VETERINARY SURGEONS, PRINCE EDWARD ISLAND, CANADA

There are vacancies for four (4) veterinary surgeons in this Province, in a scheme of subsidised practice which is being introduced by the Department of Agriculture.

The Island is situated in the Gulf of St. Lawrence, within the semi-circle formed by the coasts of New Brunswick, Nova Scotia and Cape Breton Island. It is some 139 miles long and 40 miles across at its widest point. There are approximately 12,000 farms.

It is proposed to establish four veterinary surgeons, each with a specified district allocated to him. A subsidy will be paid to each by the Government of the Province, at the rate of $2400·00 to $3000·00 per annum. Fees and drugs will be charged to the farmer at fixed, agreed rates.

Any veterinary surgeon who is interested and who may wish further information about these posts should communicate with Dr. G. C. Fisher, Veterinary Pathologist, Agricultural Laboratory, Charlottetown, Prince Edward Island, Canada.

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INTERNATIONAL RESEARCH CENTRE FOR CHEMICAL MICROBIOLOGY IN ROME

Opening Celebrative Symposium on "Bacterial Growth and Its Inhibition"

The World Health Organisation announces that the International Research Centre for Chemical Microbiology will be formally opened in Rome on June 25th. The Centre, directed by Professor E. B. Chain, F.R.S., is attached to the Istituto Superiore di Sanità, the chief centre for medical research and drug control of the Italian Government. Its Director is Professor Domenico Marotta.

A symposium on "Bacterial Growth and Its Inhibition" will be held June 25th to 30th on this occasion, and will group some 20 scientists currently engaged in important research in the field of antibiotics. The symposium is jointly sponsored by the Istituto Superiore di Sanità, the Council for the Co-ordination of International Congresses of Medical Sciences, and the World Health Organisation.

The Centre, which is recognised by WHO as an international Centre, will provide international research and training facilities in antibiotics. It will meet the need felt by many countries which lack facilities for basic research on antibiotics, particularly as regards problems of production. Its new laboratories contain large-scale pilot plant facilities for the production in substantial amounts of substances of microbiological origin and biochemical interest for research purposes.

The international symposium which will be held in connection with the inauguration of the Centre will be of special interest. The scope of papers presented and the ensuing discussion will cover most of the fundamental aspects of research on bacterial chemotherapy, including physico-chemical aspects of bacterial growth, growth factors and structurally related inhibitors, antibiotics, genetical methods as applied to the problem of drug-resistance, and of improvement of antibiotic producing strains.

The papers presented at the symposium will be published by the World Health Organisation.

Participants will include: Professor Sir Norman Hinshelwood, F.R.S., Department of Physical Chemistry, Oxford University; Dr. D. D. Woods, Department of Biochemistry, Oxford University; Dr. A. A. Miles, National Institute for Medical Research, London; Professor H. Davide, Institute of Public Health, Stockholm; Dr. M. Welsch, Department of Microbiology, Liège University; Dr. P. Regna and Dr. E. Weber, Chas. Pfizer & Co., Brooklyn; Dr. S. A. Waksman, Institute of Microbiology, Rutgers University, New Brunswick, New Jersey; Dr. M. Demerec, Carnegie Institute, Cold Spring Harbour, New York; Dr. E. L. Cavalli, Istituto Sieroterapico Milanese, Milan; Dr. A. Lwoff and Dr. J. Monod, of the Pasteur Institute, Paris; Professor E. B. Chain, F.R.S., of the International Research Centre; Professor E. Hammarsten, Director of the Karoline Institute of Chemistry, Stockholm; Dr. M. J. Johnson, University of Madison, Wisconsin, and Dr. S. S. Sokhey, Assistant Director-General, World Health Organisation.

The participants will be welcomed by Professor Marotta.

Opening addresses will be delivered by Dr. Brock Chisholm, Director-General of the World Health Organisation, and by Professor E. B. Chain, F.R.S.

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Just under half the Isle of Man has been covered under the Manx Government's scheme for the eradication of bovine tuberculosis, and it is hoped within a comparatively short time to have the whole island a clear area.

SOCIETY OF DAIRY TECHNOLOGY

Summer Conference at Troon

The biggest Summer Conference the Society of Dairy Technology has yet staged in its eight years' existence has been held at Troon, where no fewer than 176 members and guests drawn from all parts of the country and the great dairying dominions of Australia and New Zealand and representing all aspects of the dairy industry are taking part.

At its first session the party heard Mr. J. N. Ritchie, the Deputy Veterinary Officer of the Ministry of Agriculture and Fisheries, Edinburgh, discourse on "The Eradication of Bovine Tuberculosis in Scotland," followed by Dr. J. A. B. Smith, the Director of the Hannah Dairy Research Institute, who spoke on the work of the Institute. In the afternoon half of the party visited the Hannah Institute while the other half toured the West of Scotland Agricultural College and gardens at Auchincruive. They also visited Burns' cottage at Alloway.—*The Scottish Farmer.*

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Swine Fever:

Derbys.—Mill Hill Farm, Breaston, Derby (June 13th).

Durham.—Beckley Farm, Tanfield, Tantobie, Newcastle-on-Tyne (June 14th).

Flints.—Hope Hall, Hope, Wrexham (June 12th).

Isle of Ely.—Hulwood Farm, Somersham Road, Chatteris; Prospect House, Whittlesey, March (June 15th).

Lanarks.—Brackenhirst Farm, Glenmavis, Airdrie (June 13th).

Lancs.—Boothend Farm, Boothstown, Manchester (June 13th).

Leicestershire.—Hemington Lane, Hemington (June 14th).

Lincs (Holland).—St. James Farm, Postland, Crowland, Peterborough (June 12th).

Norfolk.—Poplar Tree Farm, Three Holes, Upwell, Wisbech (June 12th); Chequers Inn, Southgate Street, Kings Lynn; Lode Hall, Three Holes, Wisbech (June 15th); World's End Farm, Three Holes, Upwell (June 16th).

Peebles.—Gradenholme, West Linton (June 12th).

Sussex (E.).—Bower Hill Cottages, Plawhatch Estate, Forest Row (June 14th).

Yorks (E.R.).—North Cote Farm, South Cave, Brough (June 16th).

Yorks (W.R.).—The Bungalow, Moorland Grange, Eldwick, Bingley (June 14th); Adel Mill, Adel, Leeds, 6; Vauxhall Road Allotments, Sheffield (June 16th).

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R.A.V.C. GOLFING SOCIETY

The annual meeting of the R.A.V.C. Golfing Society was held at the North Hants Golf Club, Fleet, on June 7th, 1951. It was a perfect day with a nice cool breeze. The attendance was nearly the same as in 1950, with the addition of Captain D. P. White, now living in Canada. Captain G. S. Walker was undoubtedly the best performer of the day, winning the R.A.V.C. Challenge Cup and Prize, the Conder Cup and Prize and the Captain's Prize in the Bogey Handicap; Captain D. P. White won the Founder's Cup and Prize and Lieut.-Colonel D. F. G. Smith the Club Prize.

The annual general meeting was held after tea and the following office-bearers were elected for the coming year:—

President: Brigadier E. S. W. Peatt, O.B.E.

Vice-President: Lieut.-Colonel J. Bell.

Committee: Colonel R. M. Bamford, O.B.E., Colonel J. Judge, Captain G. S. Walker.

Hon. Secretary and Treasurer: Major J. H. Wilkins.

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HUMAN ANTHRAX IN ANTRIM

"Two cases of human anthrax occurred in County Antrim last month," reports the *Farmer & Stock-breeder* in its issue of June 12th, and continues: "Dr. P. V. Pritchard, the County Medical Officer of Health, is now fairly convinced that the common link between all the cases both animal and human that have occurred recently is animal feeding-stuffs.

"Both of the human victims, he told the County Health Committee, had had contact with animal feeding material, having regard to the serious nature of the present outbreak and the fact that other counties besides theirs were affected, though in none other had there been any human cases involved.

"Dr. Pritchard proposed that the Ministry of Health and Local Government should be approached to call a joint conference."

SOCIETY OF CHEMICAL INDUSTRY

Agriculture Group's Visit to Weybridge

The Agriculture Group of the Society of Chemical Industry selected for its summer outing on June 9th the Veterinary Laboratory at Weybridge. Dr. A. W. Stableforth and his staff showed them some of the interesting laboratory and outside work of the station.

Of particular interest to the pig industry was an experimental avirulent vaccine for swine erysipelas. This has the great advantage that its use does not leave behind any virulent organisms in the ground that could spread the disease. There was also demonstrated the vaccine that is used against Johne's disease.

The Weybridge work is not all experimental and the visitors saw the whole process involved in the manufacture and the despatch of the P.P.D. tuberculin now used as a standard for the tuberculin test.—*Farmer & Stock-breeder.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

MINERAL REQUIREMENTS OF DAIRY COWS

Sir,—May I contribute a final note to your columns in reply to Dr. J. T. Abrams' letter published in *The Veterinary Record* of May 19th?

A great deal of this letter tends only to obscure the real issue between us. The point under discussion is really whether or not the paragraph on page 305 of "Animal Nutrition and Veterinary Dietetics"—quoted in my letter of May 5th—constitutes a recommendation for the amount of calcium and phosphorus needed in the practical feeding of dairy cows. The wording to my mind leaves no doubt that it is a clear recommendation and nothing said elsewhere in the book alters the statement.

It would have been helpful to all concerned if Dr. Abrams had provided scientific references to support the figures on page 305, in the same profusion as is evident in his consideration of other facets of the subject.—Yours faithfully, K. I. Bond, 2, Mansfield Road, Reading, Berks. *May 29th*, 1951.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Fowl Pest	Parasitic Mange*	Sheep Scab	Swine Fever
May 16th to 31st 1951	16	—	7	—	—	57
Corresponding period in—						
1950	17	1	3	—	—	1
1949	8	—	31	—	—	—
1948	1	—	8	—	3	3
Jan. 1st to May 31st, 1951	236	18	470	—	4	373
Corresponding period in—						
1950	185	13	73	—	19	3
1949	84	11	214	—	27	5
1948	44	—	181	1	26	16

* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at May 31st, 1951, was as follows:—

England	Wales	Scotland	Total (Great Britain)
29,520	17,283	14,564	61,367

N.V.M.A. CONGRESS, 951

Revised Programme

Congress Meetings will be held in the Floral Hall, Winter Garden, Eastbourne

Sunday, September 23rd

EVENING: 8.0. Reception by Sussex and South-Eastern Counties Divisions.

Monday, September 24th

MORNING: 10.0. Civic Opening of Congress by His Worship the Mayor of Eastbourne.
10.30. Opening of Exhibition of Surgical Instruments, Drugs, etc., by the President, N.V.M.A.
11.30. Sectional Meetings.

AFTERNOON: 2.30. *Address*: "Control of Diseases of Livestock: a comparison of methods in different countries and their significance," by Sir Thomas Dalling, M.A., M.R.C.V.S., F.R.S.E., Chief Veterinary Officer, Ministry of Agriculture, followed by an address on the same subject by Dr. L. P. de Vries, Secretary, Animal Health Service, The Hague, Holland; and also by an American contributor.

EVENING: 8.30. Civic Reception, Dance and Cabaret, given by the Mayor and Mayoress of Eastbourne, at the Winter Garden, Devonshire Park, Eastbourne.

Tuesday, September 25th

MORNING: 9.30. *Paper*: "Johne's Disease, its Diagnosis and Control," by Dr. A. W. Taylor, M.R.C.V.S., of Compton. Opener: Mr. H. T. Matthews, B.V.SC., F.R.C.V.S., D.V.H.

AFTERNOON: 2.30. Small Animal Surgery, including X-rays, in the Gas Theatre, Eastbourne.
Ladies' Excursion.

EVENING: 8.30. Reception and Dance given by the President, N.V.M.A. at the Grand Hotel, Eastbourne.

Wednesday, September 26th

MORNING: 9.30. *Paper*: "The Application of Genetics to the Breeding of Farm Livestock," by Professor M. M. Cooper, Wye. Opener: Professor Wm. C. Miller, M.R.C.V.S., F.R.S.E.
12.0. Last meeting of Council 1950/51.

AFTERNOON: 2.30. Congress Photograph.
3.0. Annual General Meeting.

EVENING: 7.30 for 8.0. Annual Banquet, at the Grand Hotel.

Thursday, September 27th

MORNING: 9.30. *Paper*: "The Natural History of Canine Viral Hepatitis," by Mr. H. B. Parry, B.A., M.R.C.V.S., and Dr. N. M. Larin. Opener: Professor L. P. Pugh, B.Sc., F.R.C.V.S.

AFTERNOON: Free for Golf, Tennis, etc.

EVENING: 8.30. Ladies' Guild Dance, at the Grand Hotel, Eastbourne.

Friday, September 28th

MORNING: 9.30. *Paper*: "Parasitic Bronchitis in Cattle," by Dr. E. L. Taylor, M.R.C.V.S., D.V.H., of Weybridge. Opener: Mr. J. W. Bruford, M.R.C.V.S.

AFTERNOON: 2.30. Large-animal Surgery Demonstrations at the Wellcome Veterinary Research Station, Frant, Nr. Tunbridge Wells.

1. Films—shown by Mr. J. McLintock, M.R.C.V.S.
2. Rumenotomy—by Mr. K. Stuart, M.R.C.V.S.
3. Dishorning—various methods to be demonstrated.
4. Demonstration of Certain Methods for the Evaluation of Bull Semen—by Mr. J. L. Hancock, M.V.SC., M.R.C.V.S.

Ladies also invited to visit Frant, where special arrangements will be made for their entertainment.

EVENING: Dance given by the Grand Hotel.

Saturday, September 29th

MORNING: 10.0. Closing Meeting of the Congress, followed by
First Meeting of 1951/52 Council, N.V.M.A.

N.V.M.A. CONGRESS, 1951

September 23rd - 29th (inclusive)

List of Hotels in Eastbourne

The following is a list of recommended hotels in Eastbourne, giving particulars of their charges, etc. Members are advised to make reservations *as soon as possible* direct to the hotel of choice. Should a fuller list or any other information about Eastbourne be required, this can be obtained on application to the Publicity Department, Information Bureau, Eastbourne (Tel.: 4848).

The headquarters hotel for the period of the Congress and at which most of the evening functions will be held, is the Grand Hotel, Grand Parade, and block reservations of double and single rooms have been made there by the Association. These reservations will be held until the end of July *only*.*

Recommended Hotels in Eastbourne in the vicinity of the Conference Hall (the Winter Gardens) and the Headquarters Hotel

Name and Address	*Inclusive*	† *Bed and breakfast*
Licensed		
Grand Hotel, Grand Parade	36/- to 55/- per day	29/- to 47/6
Cavendish, Grand P'de	35/- to 60/- per day	30/- to 35/-
Imperial, Devonshire Place	7 to 11 gns.	—
Hydro, Mount Road	8 to 12 gns.	—
Kenilworth Court, Wilmington Square	From 7 gns.	17/6
Sea View, Grand Parade	8 to 10 gns.	—
Beaulieu, Grand Parade	8½ to 10 gns.	—
Sandhurst, Grand P'de	From 25/- per day	—
Southdown, Howard Square	7 to 11 gns.	—
Neptune Court, Jevington Gardens	5 to 8½ gns.	15/6
Clarendon, Gildredge Road	7 to 8½ gns.	—
Sussex, Cornfield Terrace	9 gns.	17/6
Clifton, South Street	7 to 10 gns.	—
Hotels and Private Hotels		
Lansdowne, Grand Parade	7½ to 11 gns.	19/6
Haddon Hall, Devonshire Place	7 to 10 gns.	—
West Rocks, Grand Parade	6 to 10 gns.	—
Wish Tower, Grand Parade	7 to 10½ gns.	21/-
Queensborough, Grand Parade	7 to 10 gns.	15/6
Oban, Grand Parade	7 to 10 gns.	—
New Wilmington, Compton Street	7 to 9 gns.	18/6
Quendon, Carlisle Road	6 to 7½ gns.	—
Lynwood, Jevington Gardens	4½ to 7½ gns.	—
Lamont, Wilmington Square	7½ to 9 gns.	—
Caithness, Wilmington Square	7 to 9 gns.	—
South Cliff, South Cliff	6 to 8½ gns.	13/6
Shirley Court, Hardwick Road	6 to 8 gns.	—
Lathom House, Howard Square	6 to 8½ gns.	15/6
Stanley House, Howard Square	7 to 10 gns.	15/6
Whitehall, Howard Square	6 to 9 gns.	—
Ben Reay, Carlisle Road	6 to 8 gns.	—
Marden, Carlisle Road	6 to 7½ gns.	—
Medwyn Court, Carlisle Road	5½ to 6½ gns.	—
Southborough, Carlisle Road	5½ to 7 gns.	—
Alwyn, Jevington G'dns	6 to 7 gns.	—
Brooklyn, Jevington Gardens	7 to 8 gns.	—
Candar, Jevington G'dns	5 to 6½ gns.	—
The Chimes, Jevington Gardens	5½ to 6½ gns.	—
Elmscroft, Jevington Gardens	5 to 5½ gns.	—
Fairlands, Jevington Gardens	5 to 6½ gns.	—
Hazelhome, Jevington Gardens	From 5½ gns.	—
Jevington Guest House, Jevington Gardens	5 to 6 gns.	—
Kuvee, Jevington Gdns.	From 4½ gns.	—
Little Seeleys, Jevington Gardens	5 to 7 gns.	—
Morningside, Jevington Gardens	From 5½ gns.	—
Rosforde, Jevington Gardens	5 to 5½ gns.	—
Springhaven, Jevington Gardens	5 to 6½ gns.	—
Sussex Guest House, Jevington Gardens	4½ to 6 gns.	—
Tor View, Jevington Gardens	5½ to 6½ gns.	—
East Mullion, Lascelles Terrace	7 to 9 gns.	—
Mowbray, Lascelles Terrace	5 to 7 gns.	—
Revelstoke, Lascelles Terrace	6½ to 7½ gns.	—
South Lynn, Lascelles Terrace	5½ to 6½ gns.	—
Edenhurst, Wilmington Gardens	5½ to 7 gns.	12/6
Farrars, Wilmington Gardens	5 to 6½ gns.	—
Kingscourt, Wilmington Gardens	5 to 7 gns.	12/6
Park View, Wilmington Gardens	5 to 6½ gns.	—
Travancore, Wilmington Gardens	5 to 6½ gns.	—
Devonshire Court, Wilmington Square	5 to 7 gns.	—
Ellesmere, Wilmington Square	5 to 7 gns.	—
Faircroft, Wilmington Square	6 to 8 gns.	—
Southview, Wilmington Square	6 gns.	—
Country Accommodation		
Birling Gap Hotel, Birling Gap, East Dean	8 gns.	
Woodside, Hailsham	From 6 gns.	
Glyndley Manor, Hankham, Hailsham	From 8 gns.	
Chalk Farm, Willingdon, Hampden Park	From 6 gns.	
Martlets, Pevensey Park Road, Pevensey	5 to 5½ gns.	

* In booking at the Grand Hotel, if attendance at the N.V.M.A. Congress is mentioned, special terms will be allowed.

† The hotels indicated offer bed-and-breakfast accommodation at the terms quoted, but only for odd nights and not for full week bookings.